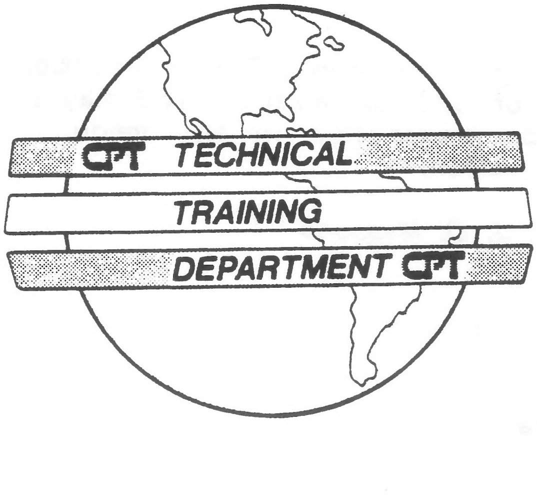
CPT

CPT Printer Multiplexer Reference Manual



CPT

Notice

The following are trademarks of CPT Corporation: CPT, CPT Phoenix JR, CPT Phoenix, Office Companion 2000, and CPT 9000.

Every effort has been made to supply accurate information. However, CPT Corporation makes no representation or warranty with respect to the contents of this publication, and assumes no responsibility for its use. CPT Corporation disclaims any liability for injury or accident incurred in conjunction with the use of the information contained herein.

Export Compliance

CPT Corporation, in order to comply with the U.S. Office of Export Administration Regulations, maintains an internal control program and corresponding manual which should be consulted for export procedures, including: identities of responsible CPT personnel, authorized destinations for individual commodity export, and CPT's specific export procedures.

Proprietary Notice

Copyright 1987. All rights reserved. The information contained herein is the confidential property of CPT Corporation, and may not be disclosed to others, reproduced, stored or transmitted in any medium except as authorized in writing by CPT Corporation.

Text: L. M. Wagner, J. D. Messano

CPT CORPORATION
Technical Training Department
8100 Mitchell Road
P.O. Box 295
Minneapolis, Minnesota
55440-0295 U.S.A.

CPT TECHNICAL
TRAINING
DEPARTMENT CPT

CPT Printer Multiplexer
Reference Manual
Publication Number 770405-000

August, 1987

TABLE OF CONTENTS

Introduction 1

Overview 2

- Hardware description and operation 2
- Multiplexer cabling 3
- Operating considerations 5

Hardware Installation 6

Configuration 9

- CPT Workstations 9
- PC compatible workstations 9
- How to use the MUX.EXE program 9
- How to remove a Select jumper 9

Checkout 11

- CPT Wordprocessing Console 11
- PC compatible systems 11

Parts List 12

This manual provides the information necessary to install, configure, and maintain the CPT Printer Multiplexer. This manual is divided into the following six sections:

1. Introduction
2. Overview
3. Hardware Installation
4. Configuration
5. Checkout
6. Parts list

The multiplexer allows up to four consoles to share one printer. The consoles may be CPT workstations, or PC compatible systems, or a combination of CPT workstations and PC compatible systems. The shared printer must have a standard Centronics parallel interface. The following CPT printers may be used with the multiplexer:

- Rotary X
- Rotary XI
- LP-6
- LP-8S
- LP-8GS

The following illustration (Figure 1) shows a sample configuration in which the CPT Printer Multiplexer allows an Office Companion 2000, CPT Phoenix, CPT 9000, and CPT Phoenix JR to share an LP-6 printer.

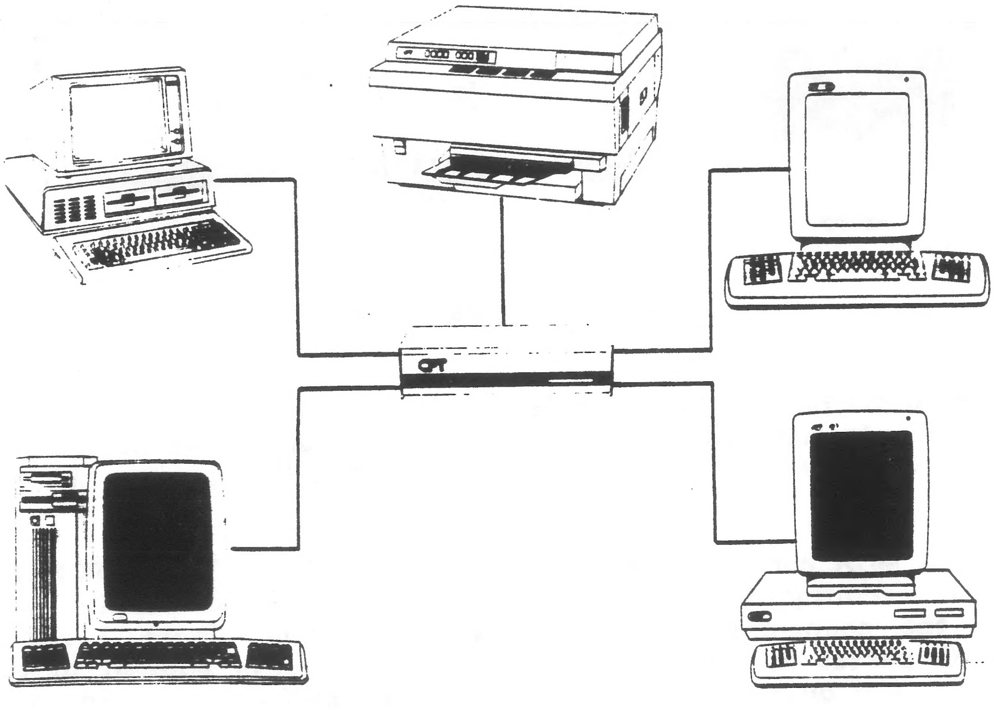


Figure 1 Example CPT Printer Multiplexer Configuration

OVERVIEW

The CPT Printer Multiplexer (MUX) may be ordered for 117 or 240 volt AC operation, however, the AC input voltage range is jumper selectable. See "Hardware Installation" for instructions on changing the input AC voltage jumper setting.

The CPT Printer Multiplexer, the appropriate AC power cable, and a utility disk (see "Configuration") are provided by ordering one of the following kits:

°CPT PN 700180-000 (117 VAC operation)
°CPT PN 700180-001 (240 VAC operation)

MUX Kit Contents:

1. CPT PN 931467-000 - Parallel Multiplexer Assembly
2. CPT PN 740073-000 (117 VAC) or 740149-000 (240 VAC) - Line Cord
3. CPT PN 770405-000 - Reference Manual
4. CPT PN 713654-000 - 5¼" DOS Utility Disk

Hardware description and operation

The CPT Printer Multiplexer (MUX) has four input ports (P1 through P4) that connect to the parallel ports of the workstations and one output port that connects to the printer (see Figure 2 below).

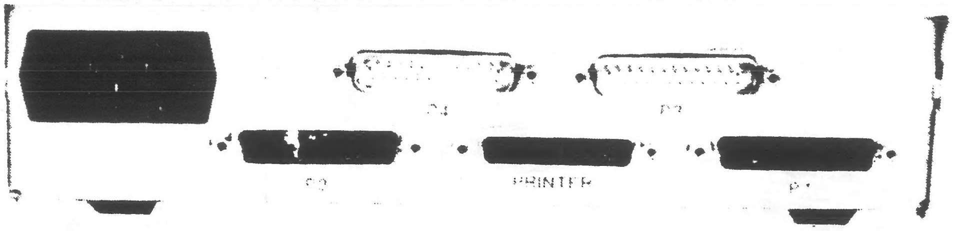


Figure 2 Multiplexer ports

The four input ports have 25 pin male connectors and the output port (Printer) is a 25 pin female connector. Each of the four input ports have a corresponding red LED on the front panel of the MUX that lights when the port is in use.

Internally the MUX contains one circuit board (CPT PN 910462-000) that provides all logic circuitry and the power supply. The power supply receives AC voltage at the connector located to the far left in Figure 2 above. The incoming AC passes through a 1/8th amp fuse and is applied to the power transformer. The output of the transformer is rectified and then regulated to +5 VDC (non-adjustable). The MUX does not have a power switch and is therefore always on while connected to AC. And since it only uses about 5 watts of power, it may be left on at all times. Under no circumstances should the MUX be off while the connected printer is on.

In addition to the power supply, the MUX circuit board provides a buffer for each of the four console input ports along with clock and counter circuitry that sequentially enables each buffer. When a buffer is enabled, any data and control signals present on the input (from the console) will be passed (non-inverted) to the output. The output of each buffer is sent to the printer via the printer port. The printer receives control and data signals and sends status signals back to the MUX and the controlling console.

The counter circuitry is used to determine which console gains control of the printer, since up to four consoles may try to send data to the printer at the same time. The counter is driven by a clock circuit and the output count is sent to a decoder. The decoder only has four possible outputs; a unique enable signal for each of the four buffers. For example; when a count of one is sent to the decoder, the decoder will output a signal that enables buffer one. When buffer one is enabled, any signals present in the buffer are passed to the printer. When the "select" signal or the "data strobe" signal pass through the buffer (active low), they will stop the clock circuit and prevent any other buffer from being enabled. When the select and strobe signals are both high again, the clock resumes and the next buffer (input port) is enabled after about a 3.5 second delay.

The clock and counter circuitry are "free running" in that each input port buffer will be enabled sequentially whether there is data coming from the consoles or not, as long as MUX power is on. Essentially the input ports are being scanned until one of them outputs select or strobe while enabled. As long as select stays low, or a low strobe occurs within 3.5 seconds, the enabled port will stay in control of the printer and the other three ports will not gain access. One other signal has the ability to stop the clock circuitry and keep a port in control of the printer; the "printer busy" signal. The busy signal is activated by the printer when such things as "ribbon out", "paper out", or "cover open" occur (printer error conditions).

The MUX has another feature that allows you to prevent the select signal from stopping the clock. By removing a jumper (one for each input port), the select line to the clock is separated from the console select line and is tied high, thus preventing a low select signal from the console to stop the clock and latch the printer. If the jumper is removed, only the data strobe signal from the console will be able to stop the clock. It must be remembered that the strobe signal is only low for a short duration and another must be received within the 3.5 second delay in order for the console to keep printer control.

Multiplexer cabling

There are two basic types of cables that you must be concerned with when connecting the multiplexer; the Console-to-MUX cable and the Printer-to-MUX cable. No cables are shipped with the mux.

The Printer-to-MUX cable is ordered separately and is available in 5 lengths from 6 to 50 feet. See Table 1 on the next page for Printer-to-MUX cable ordering information.

Printer-to-MUX cables

Cable Length	Printer-to-MUX cable PNs
6 foot	931606-000
20 foot	" -001
30 foot	" -002
40 foot	" -003
50 foot	" -004

Table 1 Printer-to-MUX cable CPT Part Numbers

Console-to-MUX cables

Console-to-MUX cables must also be ordered separately by part number. There are two types of Console-to MUX cables. The first type is a 25 pin to 25 pin cable used when connecting PC compatible systems to the Multiplexer.

The second type of cable is a 50 pin to 25 pin cable used when connecting the multiplexer to CPT workstations. Both cable types may be ordered in five different lengths ranging from 10 feet to 50 feet (see Table 2 below).

Note: The CPT 9000 and the OC 2000 are considered PC compatible workstations.

Cable Length	Console-to-MUX cable PNs for CPT workstations:	Console-to-MUX cable PNs for PC compatible systems:
10 foot	931514-000	931469-000
20 foot	" -001	" -001
30 foot	" -002	" -002
40 foot	" -003	" -003
50 foot	" -004	" -004

Table 2 Console-to-MUX cable CPT Part Numbers

Operating considerations

CPT is not recommending that the CPT Printer Multiplexer be installed in configurations where a CPT 9000 with J-Laser Board is connected to an LP-6 or LP-8S. The following problems may occur during printing or workstation bootup:

- CPT 9000 workstations with J-Laser cards must be turned on prior to the LP-6 or LP-8S printer. If this is not done, the LP-6/LP-8S will not complete its power-up diagnostic routine.
- Rebooting the 9000 (with J-Laser) while another workstation is sending a print job to the LP-6/LP-8S will cause a loss of data on the page being printed and the print job to be terminated.
- Sending a print job from the CPT 9000 (with J-Laser) while another workstation is printing to the LP-6/LP-8S will cause a loss of data on the page being printed and the print job to be terminated.

When using the CPT 9000 or PC compatible workstation with the MUX, certain software applications are known to work with the Select signal disabled (Select jumper removed). This is not a recommended mode of operation (CPT recommends using MUX.EXE and the Select signal - see Configuration), however you may find this information useful. The following software applications are known to work with the Printer Multiplexer while using only the Data Strobe signal:

Work with Data Strobe

CPT wordprocessing
Lotus 1-2-3†
Microsoft Word†
AutoCad†
Basic
dBase III†
PC Paintbrush Plus†
SuperCalc 3†
Popset

Applications that will not work with the Printer Multiplexer when using only the Data Strobe signal include the following:

Do Not work with Data Strobe

Ventura†
Windows/Paint†
Windows/Write†
9000 Printer Diagnostics
CPT Personal Typewriter

It should also be noted that some applications may not work with the MUX and it may not have anything to do with Data Strobe. Some applications will abort the print command if they find the printer busy. When attached to a MUX, these applications will only print if the MUX is free when they attempt to print.

---

† Windows and Microsoft Word are registered trademarks of Microsoft Co. AutoCAD is a registered trademark of Autodesk Inc. Lotus and 1-2-3 are registered trademarks of Lotus Development Co. dBase III Plus is a registered trademark of Ashton Tate Co. SuperCalc 3 is a registered trademark of Sorcim Co. Ventura is a registered trademark of Xerox Co. PC Paintbrush Plus is a registered trademark of Z-Soft Co.

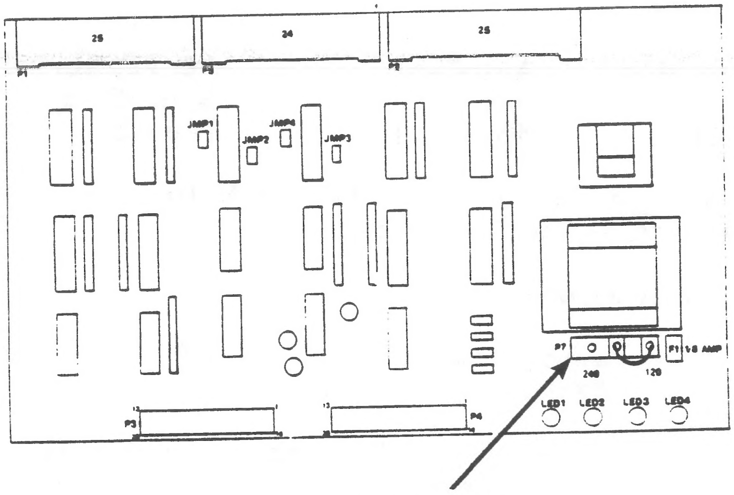
Use the following instructions when installing and connecting the CPT Printer Multiplexer hardware (cabling multiplexer to consoles and printer).

1. If you are installing the 117 volt multiplexer in a 240 volt AC environment, or vice versa, you may change the AC input jumper setting. If you already have the correct 117 or 240 volt model, proceed to step two. If necessary, perform the following steps to change the jumper setting:

    a. Using a ¼" nutdriver, remove the two cover side panel screws and loosen the bottom cover screw. Remove the cover by sliding it forward and then off the base of the multiplexer.

    b. With the cover removed, locate the 117/240 volt jumper block (P7) on the multiplexer circuit board (see Figure 3 below). The jumper block has three wire lugs that are labelled; 240, COM and 117. Leave one end of the jumper wire connected to the COM lug and then move the other end of the wire to either the 117 lug, or the 240 lug. The line fuse F1, located to the right of P7, does not need to be changed after moving the jumper.

    c. Replace the cover by reversing the procedure in step a.



P7 Jumper

Figure 3 Multiplexer circuit board and location of jumper P7

2. Power down the workstation(s) and printer that are to be connected to the multiplexer.

3. Connect the 25-pin male end of the Printer-to-MUX cable (931606-00X) to the port labelled "PRINTER" on the rear of the multiplexer (see Figure 4 below). Connect the other end of the cable (36-pin male) to the Centronics interface connector of the printer.

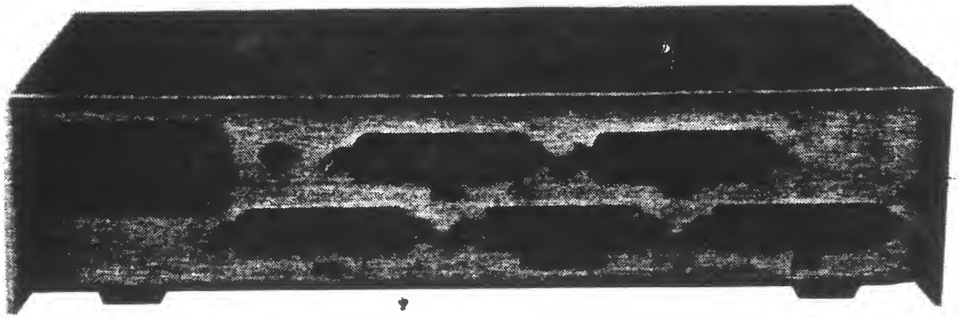


Figure 4 Rear view of CPT Printer Multiplexer

4. Connect each workstation to any one of the multiplexer ports that are labelled P1, P2, P3 and P4. Make certain that you have the appropriate cable for the type of workstation you are connecting, either CPT or PC compatible (see Table 2 on page 4). Connect one end of each cable to one of the 25-pin ports on the multiplexer and then connect the other end of each cable to the appropriate parallel printer connector on the workstation. CPT workstations have a 50-pin parallel connector and PC compatible workstations have 25-pin parallel printer connectors. The CPT 9000 and Office Companion 2000 are considered to be PC compatible workstations.

   See Figures 5 and 6 for the locations of the parallel printer connectors on the CPT Phoenix and CPT Phoenix JR. See Figures 7 and 8 for the locations of the parallel printer connectors on the CPT 9000 and Office Companion 2000.

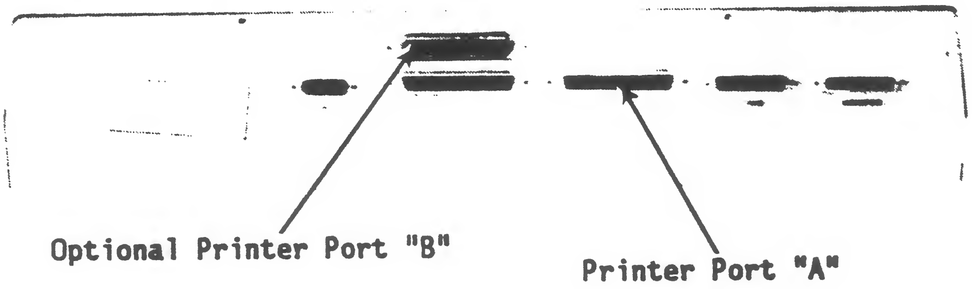


Figure 5 Rear view of CPT Phoenix JR

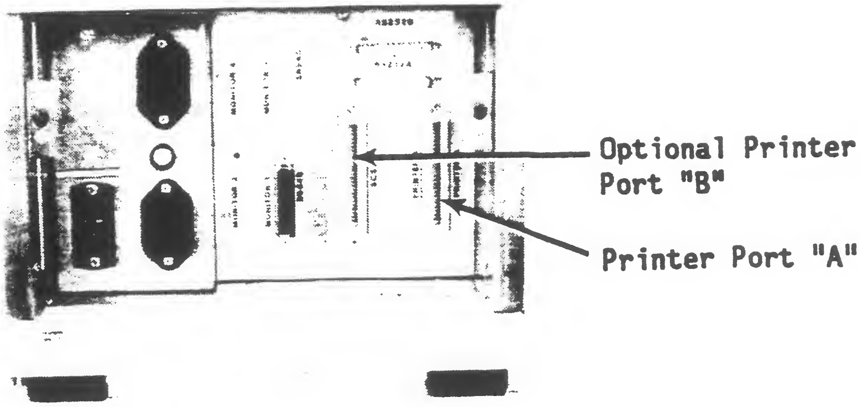


Figure 6 Rear view of CPT Phoenix

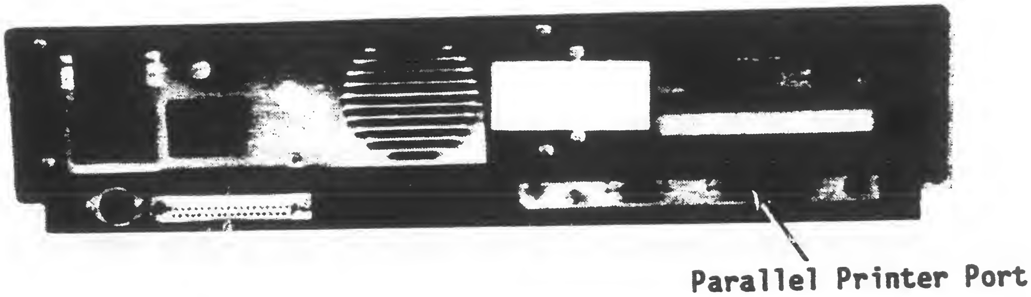


Figure 7 Rear view of the Office Companion 2000

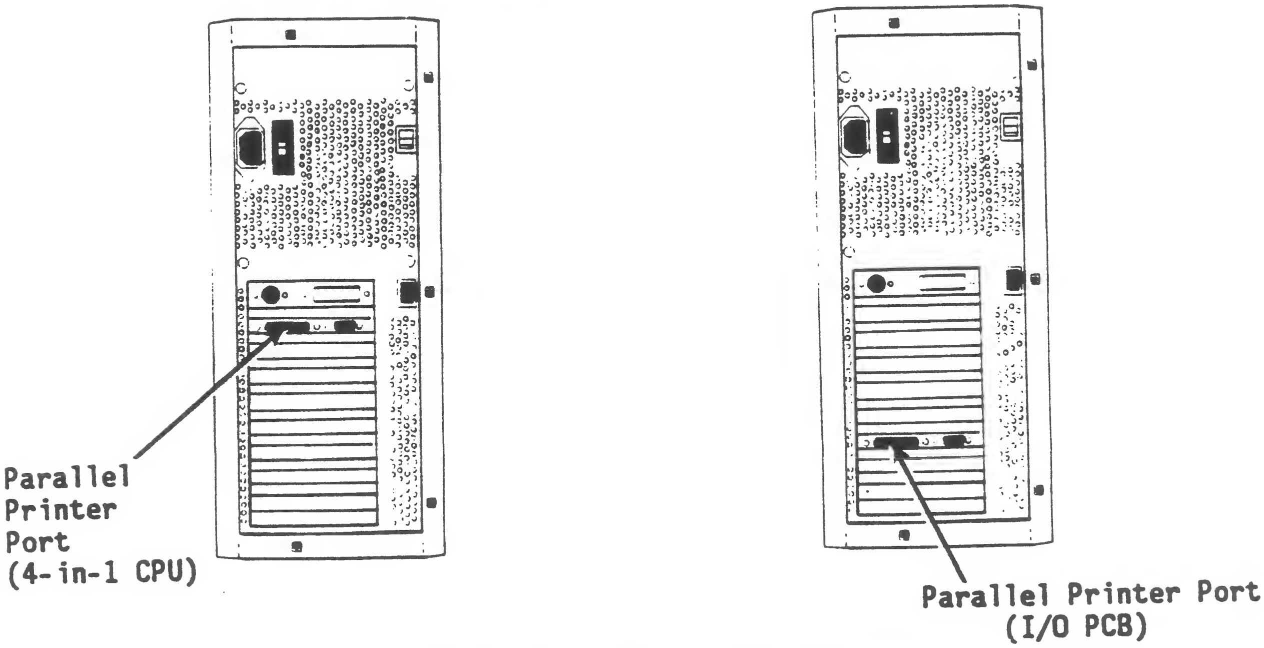


Figure 8 Rear view of the CPT 9000

The following instructions provide the information necessary to configure the software for multiplexer operation:

CPT Workstations

1. The CPT console needs to be informed of the addition of the MUX through a change in the D-page. You must make the D-page change, record the changed page back out to D and then reload software to have the change in effect. Consult your CPT console operators manual for more information about the D-page.

PC Compatible Workstations (MS-DOS based systems)

It must be noted that many PC compatible systems come up with the Select signal low. Remember from the operation discussion that if the Select signal is low, the clock will be stopped and no other input ports will be able to access the printer. There are two possible ways around this situation:

- Remove the select signal jumper for the input port connected to the PC. Doing so will disable Select within the MUX and only allow the Data Strobe signal to latch the port to the printer. It must also be noted that if the delay between low Data Strobe signals exceeds 3.5 seconds, the console will lose control of the printer at that point, possibly before the print job completes. If you note this symptom (print jobs quitting prematurely and another console latching the printer) you will need to use the second possible solution that follows.

- The second possible solution (the preferred solution) is to execute a program called MUX.EXE upon booting the PC workstation. MUX.EXE is supplied on a 5¼" floppy utility disk that is shipped with the MUX. MUX.EXE forces the Select signal to go low only during the print job, therefore releasing the printer at the end of the print job and allowing another console to take control. The Select jumper stays on.

How to use the MUX.EXE program

1. Copy the MUX.EXE file from the utility disk (supplied with the MUX) to your bootable MS-DOS disk.

2. When using the CPT 9000, run MUX.EXE after loading 9000 software. When using a PC compatible workstation, run MUX.EXE just after loading software (DOS).

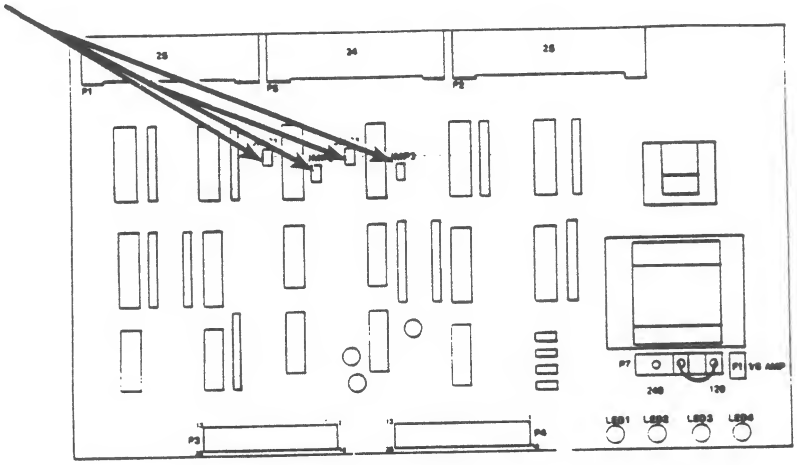
How to remove a Select jumper

1. Remove the cover from the CPT Printer Multiplexer (see Installation).

2. Locate the four jumpers; JMP1, JMP2, JMP3, JMP4. The jumper number corresponds to the numbered console ports on the rear of the MUX. Refer to Figure 9 on the next page for jumper locations.

3. Remove the appropriate jumper for the console that needs to use the Data Strobe signal.

   Note: The jumpers MUST be installed on the channels which have CPT Workstations connected.



Select Jumpers

Figure 9 Select signal jumper locations

1. Connect the CPT Printer Multiplexer to an AC outlet. Remember that the MUX must not be off when the connected printer is on.

2. Turn the connected printer on.

CPT Wordprocessing Consoles:

1. Turn one of the CPT consoles ON and load software. Remember that the D-page must be changed to recognize the MUX (see Configuration).

2. Go through the CODE PRINT sequence to select the proper printer port (A, B, or C) and the correct printer parameters.

3. Print a page of text. If the page prints correctly, you have verified your software, all hardware connections from console to the printer, and printer operation.

4. Repeat the above steps for each CPT workstation connected to the MUX. The MUX LED that corresponds to the controlling workstation should light as each console prints.

5. If there are multiple CPT workstations connected, and you have verified that each works individually from the MUX, execute multiple print commands from each CPT in rapid succession to ensure that the clock and counter circuitry is functioning properly. Each console should get its turn to print.

PC Compatible Systems:

1. Turn one of the connected PC compatible workstations ON, load the software and then run MUX.EXE. If you removed the Select jumper, just boot DOS.

2. Execute a print command from an application. If the print job works, you have verified the software and hardware setup. If the job does not complete or another console is unable to access the port after the job completes, you may have to check Configuration again.

3. Repeat the above steps for each of the PC compatible workstations connected to the MUX. Verify that the MUX LED lights to designate the console controlling the printer.

Checkout is complete when each console can access the printer, each console's print job is correct, and multiple print jobs from different stations complete in turn. As a general rule in troubleshooting, if all connected consoles fail to print, the MUX, MUX-to-printer cable, or printer may be suspect. If just one connected console fails, or less than all four, try changing ports. If the problem follows the console, suspect the cable/connection, console hardware or software. If the console works at a different port, suspect the MUX and recheck connections (remember the select jumper). CPT does not support MUX component level troubleshooting.

CPT PRINTER MULTIPLEXER RECOMMENDED SPARES

SHOP STOCK

CPT PART NO.	DESCRIPTION
910462-000	PCB Assy, Parallel MUX

OPTIONAL SHOP STOCK

CPT PART NO.	DESCRIPTION
690023-001	Bumper Foot
740073-000	Line Cord, 115VAC, 10 AMP
740149-000	Line Cord, 250 VAC, INT'L
740099-000	Receptacle, Plug
931468-000	Cable Assy, MUX, Internal

FOLD

PLACE
STAMP
HERE

CPT Corporation
Technical Training Department
8100 Mitchell Road
P.O. Box 295
Minneapolis, Minnesota
55440-0295 U.S.A.

FOLD

COMMENT SHEET

MANUAL TITLE:

PUBLICATION NO.: REVISION:

NAME: ______

COMPANY: ______

STREET ADDRESS: ______

CITY: ______ STATE: ______ ZIP CODE: ______

This form is not intended to be used as an order blank. CPT Corporation welcomes your evaluation of this manual: Please indicate any errors, suggested additions or deletions, or general comments below (please include page number references).

☐ Please Reply ☐ No Reply Necessary

POSTAGE STAMP NECESSARY

FOLD ON DOTTED LINES AND TAPE. POSTAL REGULATIONS PROHIBIT THE USE OF STAPLES.